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NEW GENERA AND SPECIES OF OSTRACODES OF THE UPPER AMAZON BASIN, BRASIL

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SINOPSE

São descritos dois novos gêneros e quatro espécies novas de ostracodes da Bacia do Alto Amazonas: Nealecythere posterocompressus **gen. et sp. nov.,** Sohnicythere tuberculata **gen. et sp. nov.,** S. inversa **sp. nov.,** Cyprideis retrobispinosa **sp. nov. Comentam-se aspectos ecológicos referentes à fauna que ocorre tanto no Brasil quanto no Peru e na Colombia.**

ABSTRACT

Two new genera and four species of ostracodes of the Upper Amazon Basin are described: Nealecythere posterocompressus **gen. et sp. nov.,** Sohnicythere tuberculata **gen. et sp. nov.,** S. inversa **sp. nov.,** Cyprideis retrobispinosa **sp. nov. Ecological aspects related to the fauna of Brasil as well as that of the Peru and Colombia region are discussed.**

INTRODUCTION

The endemic and interesting fauna of ostracodes of the Upper Amazon Basin has furnished available material to interpret aspects of taxonomy, ecology and evolutionary trends.

Some of those aspects have been already discussed previously (Purper, 1977, 1979, Sheppard and Bate, 1980) and by Purper and Pinto in the paper presented in the Eighth International Symposium on Ostracoda – Houston, Texas, 1982.

The scope of the study here presented was to improuve the systematic knowledgement of the fauna, which brought new usefull data to paleogeography, ecology, stratigraphy and evolutionary trend.

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COMMENTS ON THE FAUNA

The fauna of the ostracodes of the Upper Amazon Basin is very characteristic, and speculations have been risen up in the ecological, taxonomical, stratigraphical and evolutionary ambits.

The first studies are the ones made with Brazilian material, based on 3 wells, respectively: CPCAN-I-Tamanduá, CPCAN-II-Poreré and CPCAN-III-São Paulo de Olivença and on an outcrop in Benjamin Constant, Upper Amazon, Brasil (Purper, 1977, 1979).

Ostracodes from the same Formation, but from Peru and Colombia were studied by Sheppard and Bate (1980).

Receiving material of new wells from CPRM (Companhia de Pesquisa de Recursos Minerais), it turned out possible to enlarge knowledge of the fauna.

The endemic fauna, with many new genera and new species, permited some ecological deductions firstly based on morphological characteristics, concluding by a mixohaline environment. The presence of certain freshwater species suggest the proximity of lagoon or pool, with temporary intercalations (Purper, 1979).

Sheppard and Bate (1980) analysing the genera and species that occur in Colombia (locality CAE/GEO 33-54) and Peu (Pichua) consider the existance of two areas. *"the first in Colombia represented by locality CAE/GEO/54 with an entirely freshwater fauna and locality CAE/GEO 33 with a larger freswater fauna associated with brackish and shallow marine ostracods. The second area is that of northern Peru in the region of Pichua where both the brackiswater and the marine elements of the fauna are increased."* They supposed a marine transgression, possibly coming from the east. This statement does not agree with the occurrence of freshwater genera till 198m in the well 1-AS-32-AM in the Brazilian side (Purper and Pinto, in press).

Although there are still many doubts about the position of the marine ingression, we believe it had occurred and the region would have been isolated itself, making possible the formation of such characteristic fauna.

Besides the new genera and species already described as well as those described ahead and the ones yet not described, the material shows importance for the data presented in the vertical variations which make evolutionary interpretations possible (Purper and Pinto, in press).

Otherwise, it has permited the identification of males and females of *Chlamidocytheridea machadoi* (pl.1, fig.14-17).

SYSTEMATIC DESCRIPTION

Super Família *CYTHERACEA*
Família *Cytherideidae*
Sub Família Cytherideinae Sars, 1925

Genus *Cyprideis* Jones, 1857

Cyprideis retrobispinosa Purper et Pinto, sp. nov.

Pl.1, fig.1-13, text-fig.1

Derivatio nominis – due to the two characteristic spines at the postero-ventral corner.

Holotypus – Female, left valve. M.P. UFRGS nº MP-0-796.

Paratypi – Female, males and juvenile instar MP-0-797 to MP-0-800.

Locus typicus – Well 1-AS-32-AM (39m) Upper Amazon Valley Brasil.

Stratum typicum – Pebas Formation.

Diagnosis – Carapace subrectangular, with an almost straight oblique anterior sulcus; surface pitted. Two spines at the postero-ventral corner of the left valve; little spines at the anterior margin. Hinge of the left valve with positive terminal elements.

Description – Female. Subrectangular in lateral view, dorsal and ventral margins almost straight; anterior margin rounded passing by inclined line towards the anterior cardinal angle. Posterior margin subquadrate. Greatest height about half length. Hingement with four elements. Anterior and posterior teeth strongly crenulate on the left valve; median element with narrow and crenulate furrow at the anterior portion and slightly crenulate at the posteior part, both almost equivalent in length. Hinge elements in the right valve complementary. Duplicature with regular outline, wider anteriorly. Line of concrescence and inner margin coincident throughout. Pore canals regularly disposed; simple at the posterior border and simple, bifurcate and even trifurcate at the anterior one. Surface pitted. Dorsal sulcus inclined anteriorly, and just in front of the median length, reaching the middle line. Little spines evenly distributed along the anterior border. Two typical spines at the postero-ventral corner of the left valve. The right valve is more rounded than the left one and does not present the posterior spines. Muscle scars with four vertical scars, frontal scar V-shaped.

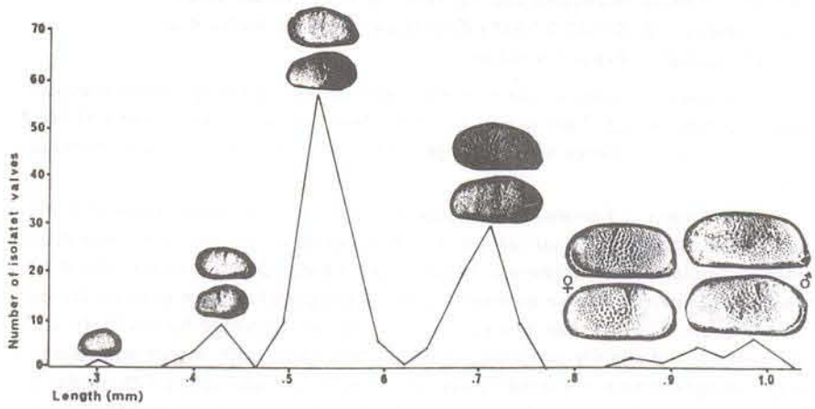
Male – It differs from the female by being more elongate, more pointed posteriorly and the ventral border is slightly more sinuate.

Juvenile instars – Four molt stages were found which exhibit the same characteristic of the adult even in the presence of the two postero-ventral spines on the left valve (Text-fig.1).

Dimensions – Holotypus: Female, LV MP-0-796, L 0,860mm; H 0,430mm. Paratypes: Female; RV MP-0-797, L 0,911mm; H 0,480mm. Male, LV MP-0-798, L 0,986mm; H 0,455mm. Male, RV MP-0-799, L 0,998mm; H 0,480mm. Molt stage LV MP-0-800, L 0,760mm; H 0,405mm.

Remarks – The present species could be compared to *Cyprideis longitesta* Krstić, 1968 but in *C. retrobispinosa* sp. nov. the antero-dorsal border is not so high and directed upwardly, no spines occur at the postero-ventral margin of the right valve and there are no terminal teeth of the hinge on the right valve.

Two female left valves were found at 107m (Pl.1, fig.12-13) that could be compared to *C. retrobispinosa* sp. nov., but they are higher than the new species, present the postero-dorsal border elevated and the two postero-ventral spines are inconspicuously developed. The presence of only two valves is not enough for them to be classified. The dimension of those two are: Female, LV MP-0-801, L 0,809 mm; H 0,430mm. Female LV MP-0-802, L 0,784mm; H 0,430mm.
Material – II isolated valves of males, 4 valves of females and 177 juvenile instars.



Text-fig. 1 – Instar diagram for *Cyprideis retrobispinosa.*

Genus *Botulocyprideis* Sheppard et Bate 1980 emend. Purper et Pinto, 1982.

Diagnosis – Oval to subrectangular genus of Cytherideinae. Hinge reverse of *Cyprideis*-type. The female having the anterior and posterior margins rouded and straight, parallel dorsal and ventral margins; the male with the posterior margins slightly tapered and sinuous ventral margin. Marginal pore canals of medium size, numerous, some of which bifurcate. Inner margin and line or concrescence coincide Dimorphic.

Remarks – Sheppard and Bate (1980) did not found males in the material studied by them. Under the material studied here males were found and, to the present authors, the pore canals are of medium size. These facts led to some change in the original diagnosis.

Botulocyprideis simplex Sheppard et Bate emend Purper et Pinto
Pl.2, fig.17-27

Diagnosis – Smooth species of *Botulocyprideis* with parallel dorsal and ventral margins and well-rounded anterior and posterior margins in the female. Male tapered posteriorly and sinuous ventral margin.

Remarks – To the description of Sheppard and Bate, 1980 were added the characteristics of the male, as the diagnosis of the genus had already been established. Attention should also called upon the hinge description in which those authors said: "Hinge weakly developed and consists, in the left valve of an elongated anterior dentate tooth, a medium locellate groove and a short posterior dentate tooth". They omitted the postero-median element that is an inconspicuously crenulate tooth. So the hinge has four elements as the *"Cyprideis*-type" but in reverse position. Some, but not great relevant differences have been noticed between the specimens of Brasil and those described by Sheppard and Bate (op.cit.).

The specimens of Pichua are smaller (0,61mm) than those of Brasil (0,73mm) but the change in the size of the ostracodes has been observed in other species at different levels of the well 1-AS-32-AM as well as with specimens of two different wells. Dwarfish aspect was noticed by Roxo (1935) when he studied molluscs from Tertiary of Upper Amazon and those of the Quaternary of Azov Sea, considering this fact as being a result of salinity change.

Genus *Nealecythere* Purper et Pinto gen. nov.

Diagnosis – Subrectangular in lateral view. Smooth surface. Hinge reverse of *Cyprideis*-type. Simple and very short marginal pore canals. Large vestibule present. Dimorphic.

Type species *Nealecythere posterocompressus* Purper et Pinto gen. et sp. nov.

Remarks – This genus is dedicated to Prof. John Neale. The new genus is related to the *Botulocyprideis* and *Pseudoparakrithella* lineage. The similarity to that lineage is the presence of the positive anterior and posterior elements of the hinge on the left valve. The great differences, however, is shown through differences suffered by the inner margin and pore canals throughout the specimens of the sequence. In *Nealecythere* the pore canals are simple, short and restricted to the outer part of the margin. Inner margin not coincident to the line of concrescence leaving a large vestibule.

Nealecythere posterocompressus Purper et Pinto gen. et sp. nov.
Pl.2, fig. 1-13

Derivatio nominis – due to the posterior compression of the left valve.
Holotypus – Female, left valve. M.P., UFRGS nº MP-0-807.
Paratypi – Female and males MP-0-808 to MP-0-814.
Locus typicus – Well 1-AS-32-AM (41m to 50m) Upper Amazon Valley, Brasil.
Stratum typicum – Pebas Formation.

Diagnosis – Left valve with posterior portion compressed both on the males and on the females. Well developed internal protuberance in the eye place. Greatest height of the right valve at the anterior portion.

Description – Female. Oval to subrectangular in lateral view; dorsal and ventral margin almost straight; anterior margin roughly, rounded; posterior one subangular principally on the left valve where it is almost pointed. Greatest height of the right valve at the anterior portion. Hinge of the left valve with anterior and posterior elongated dentate tooth; median element with short anterior locellate groove and slightly crenulate almost smooth posterior element. Hinge elements on the right valve complementary. Duplicature with regular outline, wider anteriorly. Line of concrescence and inner margin not coincident, leaving a large vestibule anteriorly. Short, simple pore canals, restricted to the outer part of the margin. Smooth surface. Left valve with posterior portion compressed. Well developed internal protuberance in the eye place (Pl.2, fig.13). Muscle scars with four vertical unequal scars; frontal scar V-shaped, elongate mandibular scar.
Male – It differs from the female by being more elongate and more pointed posteriorly.

Dimensions – Holotype LV MP-0-807, L 0,607mm; H 0,278mm; Paratype. Female. RV MP-0-808, L 0,607mm; H 0,304mm. Female carapace MP-0-809, L 0,632mm; H 0,329mm; W 0,253mm; Male carapace MP-0-810, L 0,632mm; H 0,304mm; W 0,253mm; Male LV MP-0-811, L 0,607mm; H 0,278mm; Male RV MP-0-812, L 0,632mm; H 0,278mm; Male LV MP-0-813, L 0,632mm; H 0,278mm; Male LV MP-0-814, L 0,607mm; H 0,278mm.

Remarks – There is certain resemblance to some specimens of *Pseudoparakrithella parale'a* which have the left valve with the posterior portion compressed. However, *Nealecythere posterocompressus* differs from them by having a large vestibule anteriorly and a well developed internal protuberance in the eye place.

Occurrence – Well 1-AS-32-AM (18,50 to 50,00m), Upper Amazon Valley, Brasil.

Material – 26 males valves, 32 females and 48 juvenile instars.

Sohnicythere Purper et Pinto gen. nov.

Diagnosis – Small to medium size valves. Subtriangular to subrectangular, rounded anteriorly; marginal area regularly disposed; without vestibule. Surface reticulate and strongly tuberculate. Hinge of *"Cyprideis*-type" with normal or inverted elements. Dimorphic.

Remarks – This genus, dedicated to Dr. I.G. Sohn, is placed in the family Cytherideidae by its *"Cyprideis*-type" of hinge although it presents a strong tuberculate surface which strongly differs from the general types of this family.

Sohnicythere tuberculata Purper et Pinto gen. et sp. nov.
Pl.3, fig.1-11

Derivatio nominis – due to the strongly tuberculate surface.
Holotypus – Female, RV M.P. UFRGS nº MP-0-822.
Paratype – Female and males valves MP-0-823 to MP-0-826.
Locus typicus – Well 1-AS-32-AM (54,00 to 67,00m); Upper Amazon Valley, Brasil.
Stratum typicum – Pebas Formation.

Diagnosis – Median size carapace; subrectangular; feathered with sparse spines anteriorly; posteriorly with few short spines and a long one on the right valve; hinge of *Cyprideis*-type with the positive elements on the right valve.

Description – Female. Subrectangular in lateral view. Anterior rounded margin passing through an inclined line (less pronunced on the left valve) towards the anterior cardinal angle; dorsal margin in an inclined straight line; posterior margin subquadrate. Greatest height at the anterior portion being about half length. Hinge with four elements Anterior and posterior teeth strongly crenulate on the right valve, presenting between them the median, narrow and crenulate element. This one is divided into a little anterior portion with negative and shallow structure, and into an elongate positive posterior portion. Hinge-elements on the left valve complementary. Duplicature with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Numerous simple pore canals close together and regularly disposed. Few bifurcating pore canals distally. Reticulate surface feathered with tubercles. Anterior margin of both valves with several widely spaced spines; a few short spines and a long one posteriorly on the right valve. Dorsal median sulcus surpasses the middle line. Muscle scars with four vertical unequal scars, frontal scar V-shaped, mandibular scar elongate.
Male – It differs from the female by being more tapered posteriorly and presenting a sinuous dorsal margin.

Dimensions – Holotype: Female RV MP-0-822, L 0,860mm; H 0,455mm; Paratype. Female LV MP-0-823, L 0,860mm; H 0,481mm; Male RV MP-0-824, L 0,911mm; H 0,455mm; Male LV MP-0-825, L 0,885mm; H 0,481mm; Female LV MP-0-826, L 0,860mm; H 0,481mm.

Occurrence – Well 1-AS-32-AM (54,00 to 64,00m), Upper Amazon Valley, Brasil.

Material – 10 adult valves and 1 juvenile instar.

Sohnicythere inversa Purper et Pinto sp. nov.
Pl.3, fig.12-25

Derivatio nominis – due to the inverse position of the hinge elements.
Holotypus – Female, LV M.P. UFRGS nº MP-0-827.
Paratypes – Female and male valves MP-0-828 to MP-0-831.

Locus typicus – Well 1-AS-32-AM (18,50 to 84,00m), Upper Amazon Valley, Brasil.
Stratum typicum – Pebas Formation.

Diagnosis – Small subtriangular carapace, anterior margin with around 20 downward pointed spines close together; posterior ventral margin with around 7 spines on the left valve; hinge with the positive elements on the left valve.

Description – Female. Subtriangular in lateral view. Anterior margin roughly rounded passing throughout an inclined and almost straight line towards the antetior cardinal angle; almost straight dorsal margin inclined backward; subangular posterior margin. Greatest height at the anterior portion and about half length. Surface finely reticulate feathered with small irregularly spaced tubercles. Anterior margin of both valves with around 20 downward pointed spines close together; posterior ventral margin with approximately 7 spines on the left valve and none on the right valve. A median sulcus surpassing the middle line. Hinge with four elements. On the left valve are anterior and posterior crenulate teeth; the median element is divided into a narrow locellate anterior groove and into an elongate slightly crenulate almost smooth posterior element. Hinge elements on the right valve complementary. Duplicature with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Most of the pore canals bifurcated; a few are simple. Muscle scars with four vertical scars; frontal scar V-shaped, elongated mandibular scar.

Male – Differs from the female by being more tapered posteriorly.

Dimensions – Holotype Female, LV MP-0-827, L 0,632mm; H 0,354mm. Paratype. Female RV MP-0-828, L 0,632mm; H 0,354mm; Male LV MP-0-829, L 0,607mm; H 0,329mm; Male RV MP-0-830, L 0,607mm; H 0,328mm; Juvenile instar MP-0-831, L 0,506mm; H 0,304mm.

Remarks – Based on the pattern of the surface ornamentation it resembles *Sohnicythere tuberculata* sp. nov., but differs by the marginal pore canals being more sparse and bifurcating in *S. inversa*. It also shows a greater number of spines on the anterior margin, and the presence of spines on the posterior ventral margin of the left valve which do not occur in *S. tuberculata*. The positive elements of the hinge in *S. tuberculata* is on the right valve whereas in *S. inversa* they are in an inverted position.

Occurrence – Well 1-AS-32-AM (18,50 to 84,00m), Upper Amazon Valley, Brasil.

Material – 38 adult valves and 65 juvenile instars.

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PLATE I

Fig.1-13 – *Cyprideis retrobispinosa* Purper et Pinto sp.nov.

1 – Female, left valve. Holotypus MP-0-796 40x.
2 – Female, right valve. Paratypus MP-0-797 40x.
3 – Male, left valve. Paratypus MP-0-798 40x.
4 – Male, right valve. Paratypus MP-0-799 40x.
5 – Male hinge. MP-0-798 88x.
6 – Male hinge. MP-0-799 88x.
7 – Posterior marginal pore canals. MP-0-799 88x.
8 – Anterior marginal pore canals. MP-0-797 88x.
9 – Postero-ventral spines. MP-0-798 88x.
10 – Muscle scars. MP-0-799 88x.
11 – Juvenile instar. Paratypus MP-0-800 40x.
12 – Female – *Cyprideis retrobispinosa?* MP-0-801 40x.
13 – Female – *Cyprideis retrobispinosa?* MP-0-802 40x.

Fig.14-17 – *Chlamydocytheridea machadoi* Purper, 1979.

14 – Female, left valve. Homotypus MP-0-803 40x.
15 – Female, right valve. Homotypus MP-0-804 40x.
16 – Male, left valve. Homotypus MP-0-805 40x.
17 – Male right valve. Homotypus MP-0-806 40x.

PLATE II

Fig.1-13 – *Nealecythere posterocompressus* Purper et Pinto gen. et sp.nov.

1 – Female, dorsal view. Paratypus MP-0-809 40x.
2 – Female, left valve. Holotypus MP-0-807 40x.
3 – Female, right valve. Paratypus MP-0-808 40x.
4 – Male, dorsal view. Paratypus MP-0-810 40x.
5 – Male, left valve. Paratypus MP-0-811 40x.
6 – Male, right valve. Paratypus MP-0-812 40x.
7 – Male left hinge. Paratypus MP-0-813 40x.

8 – Male right hinge. MP-0-812 40x.
9 – Anterior marginal pore canals. MP-0-812 88x.
10 – Muscle scars. MP-0-812 88x.
11 – Posterior marginal pore canals. MP-0-812 88x.
12 – Posterior marginal area. MP-0-813 88x.
13 – Left valve, anterior marginal pore canals. MP-0-814 88x.

Fig.14-16 – *Pseudoparakrithella paralela* Purper, 1979

14 – Anterior marginal pore canals. Homotypus MP-0-815 88x.
15 – Female, left valve. MP-0-815 40x.
16 – Male, left valve. Homotypus MP-0-816 40x.

Fig.17-27 – *Botulocyprideis simplex* Sheppard et Bate emend. Purper et Pinto

17 – Female, dorsal view. Homotypus MP-0-817 40x.
18 – Female, left valve. Homotypus MP-0-818 40x.
19 – Female, right valve. Homotypus MP-0-819 40x.
20 – Male, left valve. Homotypus MP-0-820 40x.
21 – Male, right valve. Homotypus MP-0-821 40x.
22 – Posterior marginal area. MP-0-818 88x.
23 – Muscle scars. MP-0-818 88x.
24 – Anterior marginal pore canals. MP-0-818 88x.
25 – Male, dorsal view. Homotypus MP-0-819 40x.
26 – Female left hinge. MP-0-818 88x.
27 – Female right hinge. MP-0-819 88x.

PLATE III

Fig.1-11 – *Sohnicythere tuberculata* Purper et Pinto gen. et sp.nov.

1 – Male, right valve. Paratypus MP-0-824 40x.
2 – Male, left valve. Paratypus MP-0-825 40x.
3 – Female, right valve. Holotypus MP-0-822 40x.
4 – Female, left valve. Paratypus MP-0-823 40x.
5 – Female, posterior spines. MP-0-822 88x.
6 – Male, left hinge. MP-0-825 88x.
7 – Female, right hinge. MP-0-822 88x.
8 – Male, detail of the tubercles. MP-0-825 180x.
9 – Female, left valve, posterior marginal pore canals. Paratypus MP-0-826 88x.
10 – Muscle scars. MP-0-826 88x.
11 – Anterior marginal pore canals. MP-0-826 88x.

Fig.12-24 – *Sohnicythere inversa* Purper et Pinto sp.nov.

12 – Female, left valve. Holotypus MP-0-827 40x.
13 – Female, right valve. Paratypus MP-0-828 40x.
14 – Male, left valve. Paratypus MP-0-829 40x.
15 – Male, right valve. Paratypus MP-0-830 40x.
16 – Muscle scars. MP-0-830 88x.
17 – Posterior marginal pore canals. MP-0-830 88x.
18 – Juvenile instar. Paratypus MP-0-831 40x.
19 – Anterior marginal pore canals. MP-0-829 88x.
20 – Posterior marginal pore canals. MP-0-829 88x.
21 – Female, left hinge. MP-0-827 88x.
22 – Female, right hinge. MP-0-828 88x.
23 – Anterior marginal pore canals. MP-0-827 88x.
24 – Posterior marginal pore canals. MP-0-827 88x.

Plate I

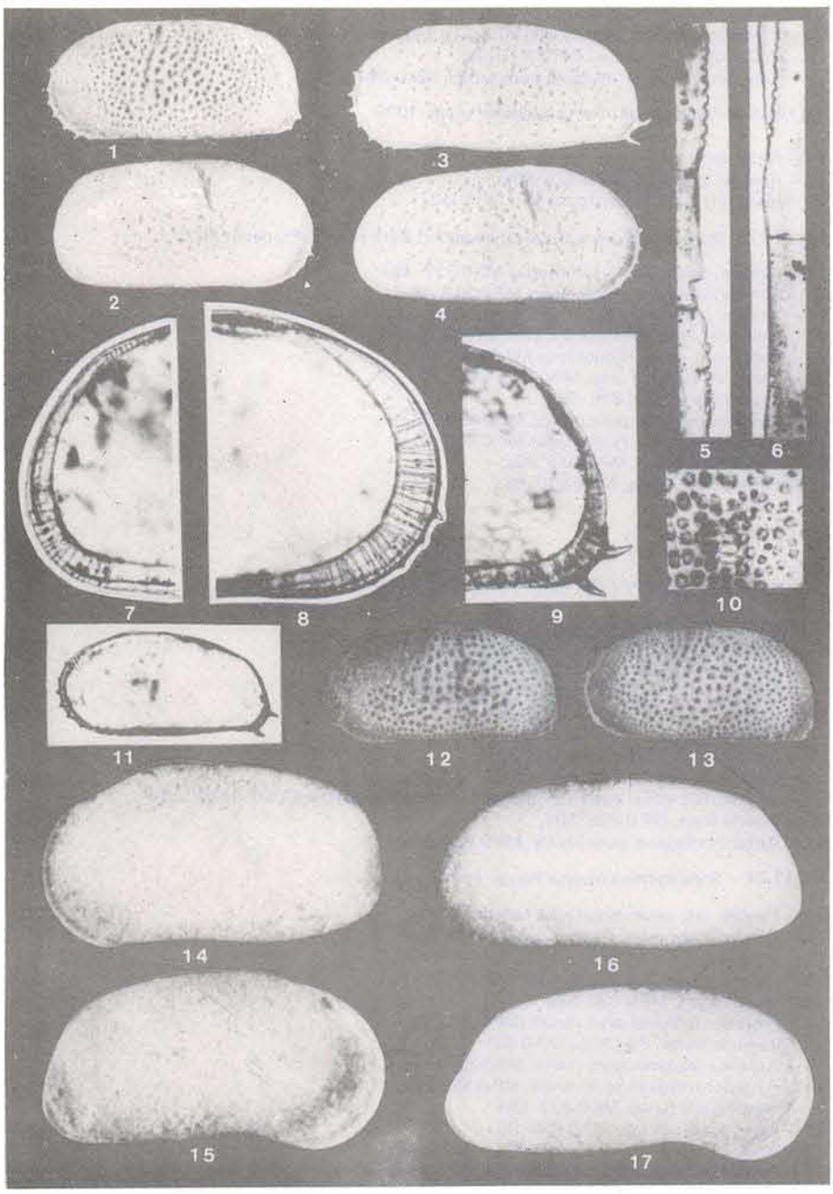

Plate II

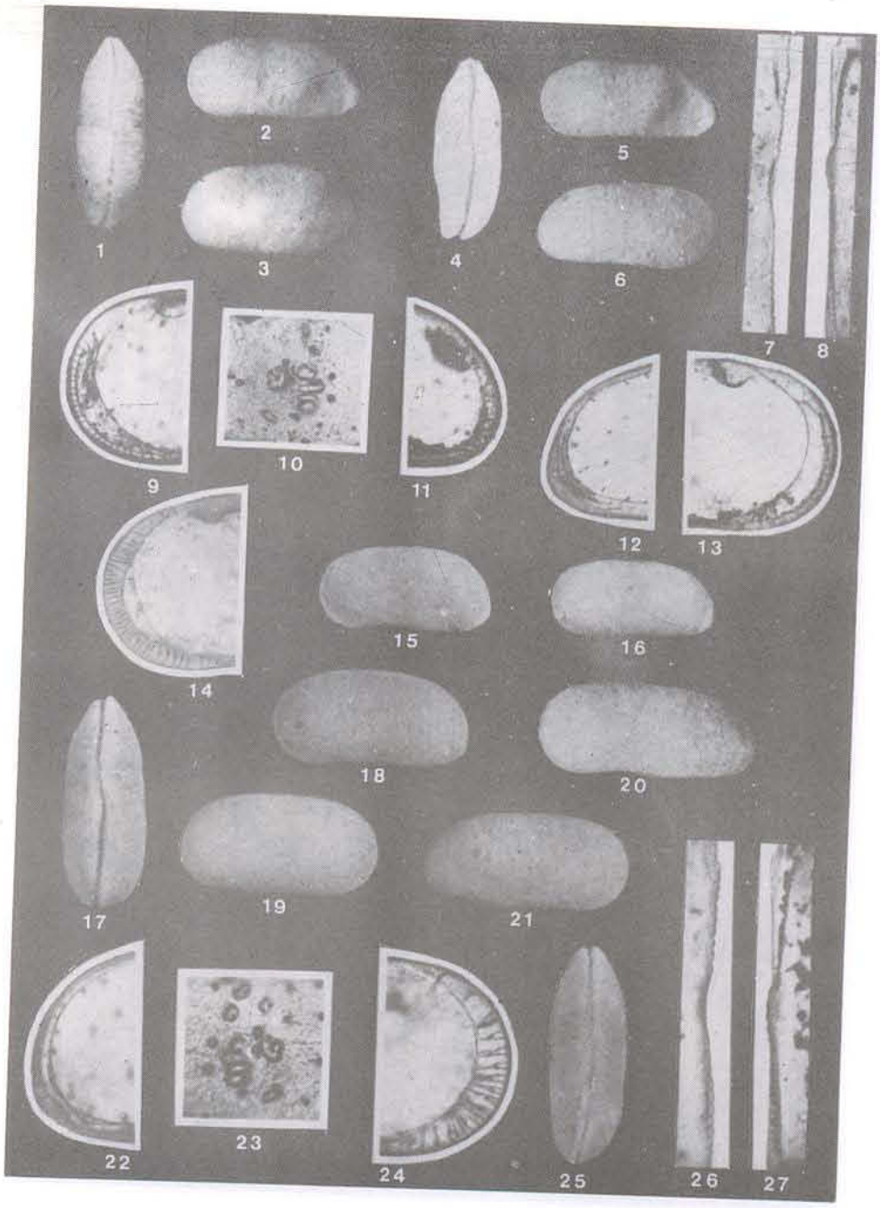

Plate III